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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/805,027	03/12/2001	Lloyd G. Burrell	FIS920000242US1	1563
30743	7590	03/01/2004	EXAMINER	
WHITHAM, CURTIS & CHRISTOFFERSON, P.C. 11491 SUNSET HILLS ROAD SUITE 340 RESTON, VA 20190			LEWIS, MONICA	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 03/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/805,027

Applicant(s)

BURRELL ET AL.

Examiner

Monica Lewis

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 December 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,5-7,9 and 10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5-7,9 and 10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 March 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to the amendment filed December 4, 2003.

Response to Arguments

2. Applicant's arguments with respect to claims 1-3, 5-7, 9 and 10 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1 and 5 are rejected under 35 U.S.C. 103(a) as obvious over Colgan et al. (U.S. Patent No. 5,565,707) in view of Shue et al. (U.S. Patent No. 6,531,389).

In regards to claim 1, Colgan et al. ("Colgan") discloses the following:

- a) a patterned aluminum layer (30) (For Example: See Figure 1);
- b) a patterned copper layer (40) (For Example: See Figure 1); and
- c) an opening (36) in a layer of material, said opening extending between a location on said patterned copper layer and a location on said patterned aluminum layer (For Example: See Figure 1); and
- d) stud connection being formed of tungsten (For Example: See Column 1 Lines 15-20 and Column 2 Lines 65 and 66).

In regards to claim 1, Colgan fails to disclose the following:

- e) a liner in said opening and having a thickness extending between said stud connection and said location on said copper layer at said location on said patterned copper layer.

Art Unit: 2822

However, Shue et al. ("Shue") discloses a liner having a thickness extending between said stud (30a) and copper layer (12) (For Example: See Figure 6). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Colgan to include a liner having a thickness extending between said stud and copper layer as disclosed in Shue because it aids in reducing parasitic capacitance (For Example: See Column 1 Lines 15-67 and Column 2 Lines 1-49).

Additionally, since Colgan and Shue are both from the same field of endeavor, the purpose disclosed by Shue would have been recognized in the pertinent art of Colgan.

In regards to claim 5, Colgan discloses the following:

a) a patterned aluminum layer includes a layer of at least one of titanium, and titanium nitride (For Example: See Column 5 Lines 23-27).

5. Claims 2, 3, 6 and 7 are rejected under 35 U.S.C. 103(a) as obvious over Colgan et al. (U.S. Patent No. 5,565,707) in view of Shue et al. (U.S. Patent No. 6,531,389) and Zhao et al. (U.S. Patent No. 6,037,664).

In regards to claim 2, Colgan fails to disclose the following:

a) a layer of tantalum nitride, and a layer of PVD tungsten.

However, Zhao discloses a liner comprising a layer of tantalum nitride, and a layer of tungsten (For Example: See Column 5 Lines 17-38). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Colgan to include a liner comprising layer of tantalum nitride, and a layer of tungsten as disclosed in Zhao because it aids in providing a barrier (For Example: See Column 5 Lines 17-38).

Art Unit: 2822

Additionally, since Colgan and Zhao are both from the same field of endeavor, the purpose disclosed by Zhao would have been recognized in the pertinent art of Colgan.

In regards to claim 3, Colgan fails to disclose the following:

- a) a layer of titanium, and a layer of titanium nitride or PVD tungsten.

However, Zhao discloses a liner comprising a layer of titanium, and a layer of titanium nitride (For Example: See Column 5 Lines 17-38). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Colgan to include a liner comprising a layer of titanium, and a layer of titanium nitride as disclosed in Zhao because it aids in providing a barrier (For Example: See Column 5 Lines 17-38).

Additionally, since Colgan and Zhao are both from the same field of endeavor, the purpose disclosed by Zhao would have been recognized in the pertinent art of Colgan.

In regards to claim 6, Colgan discloses the following:

- a) a patterned aluminum layer includes a layer of at least one of titanium, and titanium nitride (For Example: See Column 5 Lines 23-27).

In regards to claim 7, Colgan discloses the following:

- a) a patterned aluminum layer includes a layer of at least one of titanium, and titanium nitride (For Example: See Column 5 Lines 23-27).

Art Unit: 2822

6. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as obvious over Colgan et al. (U.S. Patent No. 5,565,707) in view of Shue et al. (U.S. Patent No. 6,531,389) and Jain (U.S. Patent No. 5,933,758).

In regards to claim 9, Colgan fails to disclose the following:

a) a covering layer.

However, Jain discloses a covering layer (50) (For Example: See Column 5 Lines 25-28). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Colgan to include a covering layer as disclosed in Drynan because it aids in increasing component density (For Example: See Figure 5).

Additionally, since Colgan and Jain are both from the same field of endeavor, the purpose disclosed by Jain would have been recognized in the pertinent art of Colgan.

In regards to claim 10, Colgan fails to disclose the following:

a) a covering layer includes a layer of silane based high density plasma oxide.

However, Jain discloses a covering layer (For Example: See Column 5 Lines 25-28). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Colgan to include a covering layer as disclosed in Drynan because it aids in increasing component density (For Example: See Figure 5).

Additionally, since Colgan and Jain are both from the same field of endeavor, the purpose disclosed by Jain would have been recognized in the pertinent art of Colgan.

Art Unit: 2822

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica Lewis whose telephone number is 571-272-1838. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7722 for regular and after final

Art Unit: 2822

communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

ML
February 13, 2004

A handwritten signature in black ink, appearing to read 'Mary Wilczewski', with a stylized flourish at the end.

Mary Wilczewski
Primary Examiner